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# Compensating for severe nuclear accidents: An expert elucidation

William J. Nuttall<sup>a,\*</sup>, Stephen F. Ashley<sup>a,1</sup>, Raphael J. Heffron<sup>b</sup><sup>a</sup> School of Engineering and Innovation, The Open University, Milton Keynes MK7 6AA, UK<sup>b</sup> Energy and Natural Resources Law Institute, Queen Mary University of London, 67-69 Lincoln's Inn Fields, London WC2A 3JB, UK

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## ABSTRACT

We present the results of a structured discussion held in London in July 2014 involving a panel of experts drawn from three communities: specialists on aspects of risk and insurance; lawyers concerned with issues of nuclear law; and safety and environmental regulators. The discussions were held on the basis of participant anonymity. The process emphasised three considerations: conceptions of loss arising from a severe nuclear accident; the specifics of the Fukushima-Daiichi accident and what it means for policy and strategy going forward; and the future of liability regimes. We observe some stoicism from those closest to implementation of policies and procedures associated with nuclear risks, but a lower level of certainty and confidence among those concerned with nuclear energy regulation.

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## 1. Introduction

On Friday 11 March 2011, a magnitude 9 earthquake occurred in the Pacific Ocean approximately 70 km from the eastern coast of Japan's main island Honshu. The resulting tsunami overwhelmed the defences protecting four of the reactors of the Fukushima-Daiichi nuclear power station. One of these four reactors was undergoing maintenance at the time. Unable to maintain post-shutdown reactor cooling for the three operational reactors, core overheating occurred and when nuclear fuel cladding reacted with high temperature steam hydrogen was formed which accumulated and exploded. As a result of various structural problems, some exacerbated by the explosions, radioactive contamination was propelled into the atmosphere forming a plume that travelled primarily to the northwest overland before being deposited. As a precaution a large programme of immediate evacuation and extended population relocation was undertaken (Ranghieri and Ishiwatari, 2014). The Fukushima-Daiichi disaster was the second time that such an approach has been adopted. The first arose in 1986 following the even

more severe nuclear power accident at Chernobyl in the Ukraine (Smith and Beresford, 2005).

The events that gave rise to the hydrogen explosions (namely loss of effective core cooling and high temperature fuel-cladding steam interactions) at Fukushima-Daiichi are well-known within the nuclear industry and were not dissimilar to the problems encountered at Three Mile Island nuclear power station in Pennsylvania USA in 1979, although in that case the release of radioactive contamination was far smaller, verging on negligible (Kemeny, 1979).

Given prior related experiences at Chernobyl and Three Mile Island one might take the view that fundamentally there is little to be learned from considering policy and strategy responses to the Fukushima-Daiichi disaster. The Nuclear Risks: Environmental, Financial, and Safety (NREFS) research consortium took the view that there are indeed fresh lessons to be learned. Much of the work of NREFS has concerned quantitative assessments to examine the logical basis for population relocation policies following a severe accident. Other considerations have related to nuclear power plant siting (Grimston et al., 2014),

\* Corresponding author.

E-mail address: [william.nuttall@open.ac.uk](mailto:william.nuttall@open.ac.uk) (W.J. Nuttall).<sup>1</sup> Current address: NSG Environmental Ltd., Festival House, Jessop Avenue, Cheltenham GL50 3SH, UK.<http://dx.doi.org/10.1016/j.psep.2016.12.008>0957-5820/© 2017 The Authors. Published by Elsevier B.V. on behalf of Institution of Chemical Engineers. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

nuclear liability regimes post Fukushima-Daiichi (Heffron et al., 2016), off-site emergency procedures and responses to nuclear accidents (Ashley et al., 2017a), the economic consequences of a hypothetical nuclear accident in the UK (Ashley et al., 2017b), and policy responses and strategies to restore and adjust electricity systems following dramatic capacity reduction, as has occurred in Japan since March 2011 (Haarscher et al., 2014).

This paper presents a synthesis of a round table discussion panel which was held to elicit the lessons learnt from Fukushima-Daiichi and to identify questions that may become relevant in a future nuclear accident from the perspective of insurance and risk, an area where attitudes have also evolved since the accident at Fukushima-Daiichi. The event comprised eleven UK-based experts within the fields of nuclear insurance and risk, nuclear law, and nuclear regulation.

In the title of this paper we refer to an expert elucidation. We concede this is reminiscent of a more established phrase: expert elicitation. We hope that the distinction serves a beneficial purpose. Our approach is similar to an expert elicitation, but unlike most such exercises we had no intention to uncover new data or to refine quantitative estimates of established parameters. Rather we sought entirely qualitative insights that would add clarity to existing understanding of a complex topic, i.e. to elucidate.

## 2. Material damage and third-party liability

Our expert elucidation centred on issues surrounding insurance and risk which have evolved since the accident at Fukushima-Daiichi. Insurance and risk associated with the energy sector can be broadly divided between on-site risks and insurance (termed ‘material damage’) and off-site risks and insurance (termed ‘third-party liability’). Three themes were identified in the area of material damage and third-party liability insurance in the nuclear energy sector and were used to guide the discussion of the expert elucidation that is further detailed in Section 3. These themes are:

### 2.1. ‘Loss’ arising from a nuclear accident

Loss may be defined by various legal conventions for various jurisdictions, however, exactly defining what the losses would be following a nuclear accident, and determining and providing adequate recompense for those who have suffered loss are all far from straight-forward. The potential for such a loss affects our aversion to today’s and tomorrow’s risks, and our ability to disentangle the rational and emotional response to a hypothetical event as distinct from an actual event. Therefore, the main question here was to ascertain what does ‘loss’ mean in the context of a nuclear accident for those with a practitioner perspective?

### 2.2. Claims management

After a nuclear accident, two actions need to begin as soon as possible: (1) an efficient and effective emergency management response; and (2) a claims management process. This is not only of benefit for the victims, but also part of the justice system, where victims should be returned to their pre-accident position as much as it is possible. However, from an industry perspective there will be a desire to restore public trust, and the public reputation of the industry in the country where the accident occurs and also crucially at an international level. There are several questions that arose here. In reflecting on the Fukushima accident in Japan in 2011, what is the practitioner perspective on the emergency management response and claims management process following the accident? How

did the international community respond to that event? What would be the important issues for the UK to consider regarding the claims management process and in particular if there were transboundary issues (for example, with Ireland, Denmark, and/or Continental Europe)? What role will ‘timeliness’ play in the process, and what institution could process the potential high volume of claims?

### 2.3. Liability regimes

The ability to compensate victims is certain to be a prominent issue after any nuclear accident. This is not just a nuclear specific problem, for example, at the time of writing, BP is still aiming to reduce its liability for the Deepwater Horizon spill in the Gulf of Mexico in 2010. However, a nuclear accident may result in different set of issues, in particular due to the dispersion and dissemination of radioactive materials. This is an area where there were many questions. How will losses be classified for different communities affected by a nuclear accident? For those within an exclusion zone it may be more straight-forward to compensate (as they would have suffered a ‘direct’ loss) but what will happen to nearby communities who after a nuclear accident suffer loss of income or livelihood in areas where there was no radiological damage and no enforced evacuation (and as such could have suffered only an ‘indirect’ loss)? Do today’s liability regimes sufficiently address and recompense those who have suffered direct and indirect losses? Do these liability regimes lead to a better or worse set of policies for the governance and regulation of future nuclear power plants?

## 3. The expert elucidation

On 17 July, 2014 the authors gathered a community of experts to London for a round-table discussion on the effect of the accident at Fukushima-Daiichi on insurance and risk. Experts were drawn from three principal communities: specialists on aspects of risk and insurance; lawyers concerned with issues of nuclear law; and safety and environmental regulators. The discussions were held on the basis that those speaking would not be identified nor would organisations and affiliations be disclosed. For that reason this paper will not disclose the precise sources of the ideas presented. While there may be benefit to be gained from a greater level of transparency it was felt that this would be outweighed by the self-imposed constraints that would inevitably arise if the discussions were to be attributed. A decision was made in favour of a less restrained sharing of ideas and concerns.

The discussions covered broadly three related areas of concern:

- (1) The loss arising from a severe nuclear accident;
- (2) The specifics of the Fukushima-Daiichi accident and what it means for policy and strategy going forward; and
- (3) The future of liability regimes.

The discussion was such that in each case the moderator (Professor Nuttall) invited a named individual to speak before opening up the discussion to everybody for further comment. In each case, the named individual was not obliged to make any comment. Verbatim extracts from the expert elucidation are presented in [Appendix A](#).

### 3.1. Loss

In the opening phase of the group discussion, the experts were asked to consider what the term “loss” meant to them, from their professional experience and practice, in the context of a severe nuclear accident. The first expert invited to speak came from the professional area of risk and insurance. The discussion revealed that a natural focus for a risk and insurance professional was not on the broad and somewhat nebulous considerations of all the impacts of an event, but rather on the bounded, specific and quantified amount of compensation due to provide formal recompense for an insured loss [Appendix A Boxes 1.1 and 1.3].

Those with a regulatory perspective were quick to acknowledge the importance of losses that would not be compensated. They opened the issue further still by introducing consideration of a “perceived loss”. It was also suggested that the scale of uncompensated loss could be larger than that which would be compensated for by insurers or government [Appendix A Box 1.2].

The discussion provided evidence of a difference of perspective between insurers and those responsible for public policy. The insurers are focussed on formal contractual responsibilities, whereas regulators exhibit a much greater concern for political and social expectations going beyond what might be captured by contractual frameworks.

Noting the introduction of the idea that perceptions could be important, at this point the moderator encouraged a broadening of the issues under consideration by observing that: *whatever conception we might have of loss today, is that going to be the opinion shared by the press or the Prime Minister in the weeks following a severe accident?*

Two legal experts responded, the first by reminding the other participants that when considering notions of “loss” one should not just look out to the domain of third-party losses, but one should also remember the material damage losses to the plant itself [Appendix A Box 2.1].

The second legal voice suggested that the practice of classifying losses according to a “heads of damage” was a useful framework for clear thinking in a complex space of ideas. In essence, the legal experts reminded the meeting that there are several aspects to be considered and that these are managed via different processes and tribunals. Some aspects may not be as clear-cut as perhaps the insurers would like to believe, but nevertheless frameworks should, could and would be applied in practice [Appendix A Box 2.1].

A regulatory expert did not disagree but added that the important thing in a major accident scenario could be public expectations and a general desire among those affected for life to get back to normal [Appendix A Box 2.2]. Nevertheless, the insurance and risk experts reminded the discussants that, as those at the heart of the practicalities following any accident, above all what they seek and require is clarity of responsibilities and requirements [Appendix A Box 2.3].

In conclusion, we can see a clear difference of view between those whose regulatory responsibility it is to minimise the chance of an accident occurring. Simply put, their approach is more all-encompassing and philosophical, as compared with those whose task would be to compensate for insured losses following an accident. The insurance and risk specialists gravitate to more specific and quantifiable concerns and have a focus on practicalities. Arguably, the legal experts sit in between, comfortable with a broad range of considerations, but keen that any discussion be structured and clear. The

authors see merit and utility in these differing approaches, but suggest that the evidence emerging from the exercise is that a sharing of perspectives can generate deeper awareness, and potentially synergise useful insights, for each individual expert community and for the set of stakeholder communities as a whole.

### 3.2. The response to the Fukushima-Daiichi accident

In the second phase of the elucidation, the expert panel members were asked to consider the emergency management response following the Fukushima-Daiichi accident and to comment on the claims management processes that applied in that case. The regulators were keen to comment on the appropriateness of policy in such circumstances.

A regulatory expert proposed a useful division between responses in the immediate aftermath of an accident. Essentially, this involves a pre-prepared emergency plan and longer-term, more responsive longer-term measures which might involve near-permanent population relocation, as opposed to merely temporary evacuation [Appendix A Box 3.1]. In response to these ideas, a risk and insurance expert commented on the importance of the practicalities and forward planning, for example in claims handling, and pointed to the importance of advance planning and emergency exercises [Appendix A Box 3.2].

The moderator observed that one might have a set of stakeholders who may have suffered a loss, or perceive that they have suffered some kind of harm, but perhaps there is no clear or viable route available to them so that they might receive monetary compensation. More generally, he asked, is the compensation process in Japan working at a practical level?

A risk and insurance expert offered two observations in response. First, the Japanese situation was interesting in that the insurance cover did not extend to earthquake and tsunami risk and as such the Fukushima-Daiichi accident was not “an insurance event”. He added that many nuclear power plants are uninsured for “grave natural disasters”, as these are excluded from some liability conventions. Second, while the Fukushima-Daiichi accident was not an insurance event, individuals from the insurance sector are involved because of their knowledge, experience and practical skills, and provide practical services to the Japanese commission compensating for losses. In a grave natural disaster, one could expect that compensation funds would flow from government but be administered by skilled personnel from the insurance sector [Appendix A Box 3.3].

With such comments, it is noted that insurers play a beneficial role following a severe accident even in those cases where they are not responsible for paying out on claims. Seeking confirmation on this point the moderator asked: *“would I be right in thinking that, generally, insurance pools around the world stand ready to assist in the practicalities of claims management, even in those cases where the loss would not in fact rest with them?”* A risk and insurance expert replied: *“I’m sure they would. There are fewer events than you would think that wouldn’t come under the insurance. It’s just unfortunate that you picked an example where, you know, there was a non-insured event as such.”*

One can ask: what did the world learn from the Fukushima-Daiichi accident that was not already known? This expert discussion provides an insight into one aspect of new learning. The Fukushima-Daiichi accident was arguably interesting and novel because it was a major nuclear accident where the initiating event was not within the nuclear power plant



itself. Policy-makers have been learning from that reality since the events of March 2011, and the discussion reported above touches upon the importance of that reality in the matter of compensation for loss. That said, the Japanese context is rather special and should not necessarily be regarded as typical of what might be expected to occur if there were to be a severe accident in, for example, Europe. A regulatory expert made an observation to this effect when he observed that he thought it unlikely that a future severe nuclear accident would turn out not to be an “insurance event”. His suggestion was most severe accidents would indeed be “insurance events” [Appendix A Box 3.4].

At this point the moderator sought opinion on the international response to the Fukushima-Daiichi accident. Regulatory experts tended to the view that several international and Japanese responses could now be seen to have been an over-reaction, based on an excessively precautionary approach. Arguably a similarly overly precautionary approach can be seen in the Chernobyl response [Appendix A Box 3.5].

As authors we posit that perhaps one should not solely regard any over-reaction as an excess of precaution, but one might also consider the possibility of more political considerations affecting things, such as a need for government to be seen to be doing something. Such issues are not taken to a full conclusion by our work. Of course, in respect of the accident at Fukushima-Daiichi, the UK government reaction was an international reaction and a regulatory expert was careful to point out that he saw no evidence of a British over-reaction [Appendix A Box 3.5].

### 3.3. Transboundary issues

The moderator then sought to move the panellists’ thoughts beyond the case of Fukushima-Daiichi to consider transboundary issues and scenarios where, for example, a radioactive plume travels across national boundaries as happened after the Chernobyl disaster in 1986.

A risk and insurance expert confirmed that this was indeed an area of great current interest shaping, for example, thinking around the Revised Paris Convention [Appendix A Box 4.1].

A legal expert warned that we must not forget the practical challenges involved in resolving these problems. In this context, Fukushima has been challenging and a more international event would be even more challenging as there are multiple conventions in operation, and some countries are not signed up to any convention [Appendix A Box 4.2].

The moderator responded by noting that the Irish Republic is an example of a country not signed up to any international convention on third-party nuclear liability. In that situation, there may be a risk that its citizens and institutions might seek compensation through the courts and that they might pile into, for example, the British court system if there were to have been a British accident affecting Ireland. Such a scenario would be additionally troubling as the UK court system would surely have been busy enough before the nuclear accident happened.

A legal expert agreed, confirming the observation that entities in states, such as Ireland, that had not signed up to the Paris Convention might seek to bring international claims through the convention. It was noted that lawyers had started to talk of the emergence, in effect, of a “global liability regime” although such a regime is still very far from being complete [Appendix A Box 4.3].

A risk and insurance expert added that he thought it unlikely that any a future accident would ever produce “a flood” of international transboundary claims [Appendix A Box 4.4]. A legal expert responded by saying that, while he agreed in principle, one must remember that some countries are more litigious than others. He also added one must not forget the impact of nuclear infrastructure investments on the international relations within a region. There has been much European political experience of “transboundary issues” [Appendix A Box 4.5].

A risk and insurance expert added that his sector had a relatively good and improving grip on transboundary issues. The conventions are important, but are necessarily less precise than the arrangements considered by insurers for transboundary claims management. Things are moving forward arguably even towards a global regime [Appendix A Box 4.6].

A regulatory expert stressed the importance of a timely response to an accident [Appendix A Box 4.7]. A speedy response can greatly improve the victim’s experience. There is a beneficial role for prompt ex-gratia payments that can reduce negative impacts and can build trust.

Risk and insurance experts responded, one expert pointed to the conventions saying they should help with speedy settlement. In addition the conventions are bringing in more heads of damage, so more types of loss could be compensated via the conventions which presumably is a good thing [Appendix A Box 4.8]. Another risk and insurance expert added that the speed of compensation is improved if the insurance specialists are allowed to be present in the emergency room managing the incident [Appendix A Box 4.8].

Regulatory experts continued to be interested in where the boundary is located between a loss or harm caused by the nuclear incident and things which should reasonably be regarded as out of scope for regulation and compensation. For example, a negative psychological impact could be triggered by the incident in some vulnerable people while “reasonable people” might be unaffected. Should impacts on the psychologically vulnerable be an issue of policy concern [Appendix A Box 4.9]? In this way it became clear that the policy issues might not be as clear cut as the insurance experts had been suggesting based on their more focussed concerns centred on compensation.

There were two boundaries in the minds of the experts in respect of the topic of “loss”. One was the notion of what should be regarded as a loss and those things that should or could not be handled by policy. The other aspect concerned political geography and transboundary issues: the idea of international legal cases being presented by harmed entities in a third-party country (outside the international conventions) in the courts of a country that had been the location of a nuclear accident. The moderator was keen to hear if the experts thought that such suits would have a chance of success? A legal expert commented that it would depend on the specific circumstances but one might be able to make a successful tort claim arguing a breach in a duty of care or negligence [Appendix A Box 4.10]. In response an anecdotal intervention was made by one of the risk and insurance experts:

*“I don’t know if this is an apocryphal story or not, but Three Mile Island, you know, there were a number of claims that were made by people living on the West Coast for psychological damage as a consequence of Three Mile Island on the East Coast. Now, I don’t know how the American legislature works, but I would hope that*

*if a similar thing happened in the UK, you know, the court would throw it out."*

Closing this phase, a regulatory voice responded and made a link back to the earlier discussion of boundedness in other the sense, i.e. concerning the scope of what might be considered a loss:

*"We do know, I think, that people are more fearful of the harm from radiation than from other sources of harm, which are on the same level, and that might be seen as unreasonable."*

In summary, there remain areas of policy ambiguity concerning the scope and extent of loss that should be addressed by policy, including for instance psychological harm, particularly to vulnerable individuals such as those with mental illness or simply prone to irrational thinking. While there was a level of comfort provided by the international conventions concerning transboundary issues there was some residual concern and uncertainty regarding transboundary impacts in non-convention countries and whether this could open up the risk of large scale transboundary litigation in some circumstances. Finally it was noted that anxiety issues can arise very far from any location of actual physical harm and surely policy should not fall into a trap of compensating such long-distance perceived harm.

### 3.4. BP Macondo incident 2010—lessons there?

Of course the nuclear industry is not the only sector with the potential to cause widespread harm and disruption. The moderator was keen to hear from the experts whether useful lessons might be learned, for example, from the 2010 BP Macondo incident in the Gulf of Mexico associated with the problems at the Deepwater Horizon drilling rig. The moderator observed that the oil company BP had limited liability<sup>1</sup> but nevertheless chose to make payments far beyond that limit. He introduced the topic with the words *"there was a cap, which BP let be ignored. Also what I understand from the experience around Macondo is that a lot of people got compensated, even though, arguably, they didn't have a very good claim"*.

Various legal experts commented on this point. One observed that while BP had gone far beyond what was arguably required in offering compensation its response was shaped by two factors, which may not transfer to the nuclear sector. The first was the nature of the business (end-customer facing in competitive retail markets) and the second been the amounts of cash available to the business. BP could afford to make the large payments without risking bankruptcy. Bankruptcy would help no-one in such circumstances [Appendix A Box 5.1]. A risk and insurance expert responded by saying that for a nuclear accident scenario, liability is clear cut and becoming clearer still. This expert did not see parallel ambiguities of responsibility and accountability in a nuclear scenario and concluded by noting that much of the political and media pressure surrounding an accident could be seen not as a desire for proper legal mitigation and compensation, but more as an act of Schadenfreude [Appendix A Box 5.2].

Here we see again stoicism from those most connected with matters of risk and insurance and a wider set of concerns around possible scenario developments from the legal experts.

### 3.5. Trust, fear and responsibility

One of the risk and insurance experts was keen to clarify the issues raised by the proceeding discussions by observing that in the UK, direct losses, including psychological harm, were very likely to be handled efficiently and with little ambiguity requiring interpretation by the courts. Indirect losses would be held to be out of scope, for instance psychological aspects with no direct connection to the accident [Appendix A Box 6.1].

The moderator remarked: *"But do you think it's sufficient for the process to consist of a letter from the insurance community that says 'Thank you for your claim but, sorry, it is denied,' and that's the only process, or do you think that the country needs to do more to manage the disappointment, the anxiety, the fear of these people who think they're affected when maybe they're not?"* A regulatory voice responded by suggesting that they should, but not after the event, before the event. The moderator suggested that this might imply a role for government.

A risk and insurance expert agreed with the benefits to be obtained in acting in advance of any incident and work has been done, but getting the message across of the real risks of radiation has not been easy in the face of fear and vague associations in people's minds with nuclear war [Appendix A Box 6.2]. A legal expert agreed that much work had been done and it was good work. It was important to remember the current openness of the nuclear industry compared to how things were in the 1980s [Appendix A Box 6.3]. To which regulatory voices responded first by saying that it could be argued that precautionary approaches in accident management had led to an unwarranted increase in public anxiety about nuclear power. Another regulatory voice stressed the importance of media actions following a major accident as being important for the best outcome in all of the domains of the meeting's consideration [Appendix A Box 6.4].

The moderator remarked that today we have global media and the internet—it is not as it was in the 1960s when nuclear power first started. A regulatory expert agreed suggesting that this reality worsened the problems that might be faced by those attempting to manage the response to a severe accident [Appendix A Box 6.5]. Another regulatory voice stressed the importance of public expectations in this regard [Appendix A Box 6.5].

At this point the moderator introduced a provocative question in a UK context: *"is our liability regime fit for purpose?"*

Significantly, a regulatory expert responded *"Well, the fact that the Paris Convention is being redone and then the Nuclear Installation Act is being redone must say that it's not fit for purpose at the moment because it's being changed. I mean, otherwise, there'd be no need to change it, so I would have thought that it's self-evident that it's not fit for purpose at the present time."*

### 3.6. Blight

The final topic considered by the experts concerned "blight". The panellists were invited to imagine a scenario with a place where nobody's health was affected at all. Nothing bad had happened to them in any rational sense. Is there an issue of a zone of people whose lives are adversely affected in our irrational world, and who would not, as things stand, receive conventional compensation? Might they be living in a zone of blight?

A risk and insurance expert observed: *"This might well be an area where you would have a class action because the cover provided by the insurer may well not include this, because there's no*

<sup>1</sup> As discussed further in Heffron et al. (2016).

blight as such. There's no actual thing, but the Government told you to get out so therefore you'd have a class action against the Government because they were the people who told you to get out, or the policeman, or whoever it was that said."

In response the moderator suggested: "Imagine there was no advice to leave and they left anyway, and now they claim their house is worthless". To which the insurance expert responded that in a UK context mere blight would never be compensated. A regulatory view was heard in response: "Remember, in the context of Chernobyl, there were a very large number of people who had very small doses, living within areas of relatively low contamination, who, according to certain criteria, were able to be termed formally 'Chernobyl victims', and, as a result, got a whole range of benefits, including things like free holidays. So, you know, that may be relevant in terms of 'blight' can mean even more, and it can also have some positives."

It would appear there are a range of issues here that could prove troublesome to policy-makers. In a UK context it is important to reflect on the importance of home ownership on real and perceived individual wealth. Any erosion of property prices attributable to the accident could be politically difficult, even in a clear situation of no legal entitlement to any compensation.

#### 4. Conclusions

One round-table discussion cannot be expected to solve complex policy problems, but it can help us better appreciate whether they exist and provide some greater clarity concerning key issues. As a consequence of the research we see a clear difference between the stoicism of those closest to implementation of policies and procedures associated with nuclear risks and the greater sense of uncertainty coming from those concerned with nuclear energy regulation. Frequently the concerns of regulators relate to the boundedness of the problem. The boundary of responsibility may, or may not, be defined in law, but even when things might appear to be clear ex-ante, following a severe nuclear accident political pressures can be expected to be important. The nature of political influence and its power will depend upon the accident scenario.

The expert elucidation described here was merely a first step in our research in this area. We intend to follow this work with surveys of a larger number of selected experts that allow for an improved and more detailed understanding. We also seek to bring in consideration of different national perspectives and approaches. Another possible area of additional further work could be to examine the evolution of nuclear insurance law and practice compared to the evolving experience of terrorism insurance. Similar to nuclear risks, terrorism insurance has a history of policy exclusions and of state participation.

In closing we see potential for greater academic research and scholarship concerning the consequences of severe nuclear accidents and the practical actions to be taken in such a scenario. The research presented here suggests that various expert communities concerned with such matters have differing levels of stoicism and concern. They see the issues rather differently. Through expanded communication and understanding we hope that better preparedness and resilience can be achieved in advance of any accident. We plan to explore these issues further in future research and hence to recommend improvements to policy and practice in this area.

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#### Appendix A.

In this Appendix we present extracts from the transcript of the expert elucidation meeting. This is presented so as to allow the reader to see the evidence underpinning the narrative and conclusions presented in the main body of the paper. In the Appendix references to expert 1 and expert 2 etc. are merely provided so as to make it clear that there is a change of voice within a dialogue. The numbering does not extend beyond a given text box, so as to prevent an assemblage of one individual's views and hence preserve more strongly the anonymity promised to the participants. The Appendix is structured in numbered boxes to allow for easier linkage to the main text. We adopt the following conventions when presenting the transcripts: [word] here a word has been inferred, as it was omitted. inaudible or indistinct in the recording; [...] here some transcript text has been omitted; and <> denotes where a proper name has been removed so as to preserve anonymity.

##### Part 1—comments on "loss"

###### Box 1.1

**Risk and insurance expert:** "Loss, as a general broad term doesn't really mean anything. Loss only means something to me if the aim then is to compensate an individual for that loss, and so, we immediately move on to the idea of compensation and compensation regimes and all the rest of it."

I would argue that they're designed for the victim and there are some clear ground rules established within these regimes, such as, the principles that we all talk about of channelling, of limited liability, requirement for insurance and so on. [...] Loss, in a sense, has to be, can only be, defined in terms of what is established in there and what the market is able to provide cover for. It's no point having a very wide and indefinite description of loss if no one, at the end of the day, is prepared or willing or able to provide cover for it, and pay for it."

###### Box 1.2

**Regulatory expert 1:** "The biggest impact may have come from something you can't compensate for. [...] You want to safeguard against that loss, not by compensation but from stopping it happening."



**Regulatory expert 2:** “If we start from the position of saying what actually of the perceived losses and the actual losses that people experience following something like Chernobyl or Fukushima, some proportion of those will turn into things which are compensated, others are a broader actual categorisation of loss, which may or may not be compensated. [...] You’ve got, obviously, things like health effects, some of which are very obvious, you know, potential cancers, early effects and so on, but following Chernobyl, there was an enormous amount of stress and things of that sort, and many people have said that was actually the biggest health consequence of the accident. You can look at things like some of the more obvious things, like immediate loss of industrial output, agricultural output, and so on, which were clearly things that manifested themselves after Chernobyl. You can see, you know, loss of livelihood, loss of housing, you know, if people are relocated and things of that sort. And then, as you were saying, there’s issues around trust, there’s issues around, you know, the community, the environment and so on, which are much woollier, much more difficult to sort of grasp, and then there are fundamental things like, you know, in both cases, the loss of power, you know, and the cost of actually having to compensate for that and produce new power from different sources.

My contention would be: those things that you can’t compensate for are probably more significant to society than those you can, and that, therefore, the protection methods you put in place and why you regulate so fiercely perhaps, or intrusively, is because of those wider aspects of society. So, for example, Fukushima, I know, because I was involved, that the British Government were looking at the loss to the manufacturing industry in the UK from loss of supply because that coast of Japan actually has got a lot of supply industry components coming from it there. And those things, you can’t compensate.”

### Box 1.3

**Risk and insurance expert:** “I also understand that that sort of...sort of non-priceable stuff has to be factored in to the regulatory regime to make sure the operator does everything in its power to be as safe as possible. I just think it’s very difficult to encapsulate all of it for the purposes of compensation. Where do you draw the line?”

## Part 2—Wider considerations of “loss”

### Box 2.1

**Legal expert 1:** “I suppose the other point, looking at it the other way, is all the conventions related to third-party loss, so essentially things off the nuclear site, and the thing we often forget is the compensation on the nuclear site and the legal regime that sits around that, which of course is very different. So, that is obviously...what happens on the site affects all these areas that we’re talking about, but that’s often forgotten and it’s often a big commercial risk for developers etc.”

**Legal expert 2:** “I’m coming from a lawyer’s point of view, I would say nuclear risk and liability really comes to light for us, on a practical level, in the contracts, when you’re looking at the potential risk that might appear, let’s say, if an incident happens, where the kind of potential losses that you mentioned arise. However, I have to admit, we don’t look as wide as had already been discussed to the actual losses which have been suffered on a realistic level...or on the ground, especially in events such as Fukushima. But what we have as a basis, is...how liability is legally defined, - the ‘heads of damage’, within the conventions themselves, but there is also the issue of where something isn’t covered by a convention, then would it be covered by the national law, i.e., as governed by the law of tort if we’re looking at this country, for example, and then we start to move into, for example, the law of negligence. [...] To show that there is a loss, let’s say, in legal terms outside of the Conventions, then that would then need to be linked in some way to negligence or to show a duty of care, but also foreseeability, causation and other legal principles like that depending on the tort committed.”

### Box 2.2

**Regulatory expert:** “When I was in the regulator, we did some work on sort of expectations and we asked the pseudo-public about, well, what’s your expectations in nuclear, and the general response we were getting back was they were largely untroubled by it in terms of they wanted just to lead their lives and let the industry get on and do it. [...] So, there is another side to this argument. And I don’t mean compensated for loss of work or health reasons but I mean just for loss of their way of life for several months, several years. Do you compensate people for that?”

### Box 2.3

**Risk and insurance expert:** “There are the two aspects to loss, if you like, tort and the actual Nuclear Installations Act, and then you come to insurers. [Insurers are] always the last people, and I think that that is where [they] sit – [...] they] know what [their] liabilities are because [insurers] can then cost that and charge that out. Now, it may not be all of the liabilities because [insurers] can’t actually, as you say, compensate for that country’s loss of face, whether it’s Japanese face or English face, doesn’t make any difference, but that’s where [they are] at. [Insurers] then come in to that part. So, [they are] happy to do things and provide cover when [they] know what [they are] doing.”



### Part 3—comments on Fukushima-Daiichi accident

#### Box 3.1

**Regulatory expert:** “I mean, from a sort of regulatory industry, scientific point of view, you know, following the accident, you have effectively two phases, I think one can say: sort of an emergency phase, where you’re thinking about how do we protect people over the first week, the first couple of weeks, and you do things – I suspect you haven’t got a great deal of time to look at the cost-effectiveness of everything. You should have a good, well worked through emergency plan, if possible, but I mean, the situation is that it’s probably going to be dictated by events and by, you know, pressures that emerge from the details of the accident.

I think you then get into the longer phase. [...] over the longer term, many of the things which take place are quite difficult to justify in terms of their, what I’d broadly say, cost-effectiveness, and you have to ask why. So, a prime example of that is: people being relocated. Following Chernobyl, you know, several hundred thousand people were relocated completely away from Chernobyl. [...] some of the measures look, with the benefit of hindsight, cost-effective, some of the clean-up measures for agricultural and urban decontamination and so on, but some of the more radical measures, like relocating people in vast numbers, very, very difficult to see how that could be cost effectively justified. [...] The more important issue is, you know, actually trying to get a balance between what is cost-effective and actually responding to the pressures in society and the concerns that people are expressing.”

#### Box 3.2

**Risk and insurance expert:** “The situation there [Japan] is that they have got about 3,000 claims handlers to actually handle the individual claims that are coming in. They’ve had a lot of claims come in for fear or mental anguish or whatever you like to call it. They’ve had. . . a lot of property claims are now starting to come in, and that’s the next stage of that, if you like. And, in between, there are other claims, like the evacuation, and it does take time to organise and time to make sure there is something done properly. Now, we, as an insurance industry, are looking to try and put things in place before it happens. You can never put enough in place to handle everything, but we do take part in the emergency exercises. We sit in a very dark corner, but we’re there in case, you know, somebody says, ‘Well, what if I evacuate these people, is that covered under the insurance – who’s going to pay?’ and we can say, ‘Well, perhaps not us,’ you know, and things like that! So, you know, there are all of those situations that we need to get into, and, you know, as you said, you know, it depends on who’s ordering that evacuation as to whether it’s something that might or might not be covered. So, I think, in Fukushima, they’ve responded quite well, but, like everywhere, it is going to take some time to set up a big enough operation to do that.”

#### Box 3.3

**Risk and insurance expert:** “I think they’re working. [...] It’s not an insurance event. And you might expect it to be, but in many countries, insurance is excluded for grave natural disasters. Now, funnily enough, this isn’t a grave natural disaster. I don’t quite know what would be a grave natural disaster. But there are two other aspects under the Japanese arrangement – there were two other exclusions, the tsunami and earthquakes are the two exclusions, under [...] the insurance product that was taken, and that is because they get a lot of earthquakes in Japan and so it’s something that the Government looks after, but they make responsibility of the operator to have that cover in place for that, or they are responsible for the first amount of that, as they are for tsunamis. Putting it into that box means that TEPCO were responsible, as opposed to the Government responsible.

They have a commission in place that does the claims handling, and, yeah, I think the pool are doing a lot of assistance there because, you know, they’re the people. . . insurers, at the end of the day. Government aren’t insurers, so they don’t have the expertise to handle claims, and the same as in this country, if there was a big event and there was a reason why it wasn’t an insured event, then we would be saying to Government, well, look, we’re the people that know how to do this – we’ll do it for you, and we hope that they would say yes. And when you get to the limit, because there’s a limit on everybody’s policy, what happens then? The Government then becomes responsible for the. . . for the compensation that you’re paying, and again, you would expect the insurers probably to deal with that. It might be. . . lawyers might take it on because I think, to a certain extent, the Coal Board situation might apply, but I’m not sure the Government would go along with that because it’s something they’ve tried and they think there could be a different way.”

#### Box 3.4

**Regulatory expert:** “The emergency management thing, if you take it very much on the face value, they were very successful in protecting people from harm from the radiation. There will be no extra cancers, this is according to the international organisations, that can be detected from that. However, I’ve seen some information from the Japanese that says there’s 2,900 plus deaths, early deaths, from the impact of the evacuation, so there is then a question: who insures and is compensatable for those deaths? Where, perhaps for very good reasons, because they didn’t have data, they didn’t know, they had to take decisions, and so they evacuated people, where, if you sit back, you might have sheltered some, because people could die because they’re invalided in homes, they’re frail, or the stress of moving actually takes them over the edge, and there may be accidents while you evacuate. So there is a balance there, and then the question is, well, who makes the decision on the evacuation? Was it reasonable in the circumstances? And is it compensatable there? So, there are aspects of that evacuation that are very interesting actually and, talking to the Japanese regulator about how they optimise, and then how do you discuss with people. The problem you get if you say let’s just do a cost-benefit analysis, and we won’t evacuate so much, you’ll get self-evacuation.”

**Box 3.5**

**Regulatory expert 1:** “I think there were some governments who responded inappropriately, if you look at it technically. The UK Government, to my mind, responded very effectively and appropriately. But, also, some of the institutions, the International Atomic Energy Agency, they were slow in giving information I think. One of the issues is about information flow, as quickly as you can there. After that, they responded, you know, sending missions out there.”

**Regulatory expert 2:** “My understanding, is that the Japanese are trying to save or regain the trust and reputation, and by doing things to a level which is not necessarily appropriate.”

**Regulatory expert 3:** “Well, I think they will. . .well, one, they won’t actually address the real hazards, but then, again, they’re falling into the trap of doing something that’s unreasonable. It’s not technically justified and it’s done for political reasons, rather than saying, look, we don’t think it’s right to get it down to this level because there’s no need because it’s at that level outside the site, and we can then put those resources in dealing with the hazards on the site. So, you’ve got to have a more sophisticated argument.”

**Regulatory expert 3:** “There’s been a very strong precautionary element in almost everything that’s been done. I mean, particularly in the case of Chernobyl, that was very strongly the case, and internationally [. . .] There was this element of trying to be precautionary, trying to develop trust, try to show people that you’re doing all that you can. But, back to my earlier point, you know, in economic terms, you’re probably spending far too much money doing that, and that’s where the communication comes in because all those three things are linked.”

**Part 4—comments on transboundary issues****Box 4.1**

**Risk and insurance expert:** “Trans-boundary issues, that’s a really interesting one. There are moves afoot, based within the EU, but also from some of the trans-boundary operators, of developing a pan-European claims management system, so we’re largely looking at that as a way forward. What we would do, I don’t know, at this stage. I mean, we’ve got a UK claims handling system that’s managed by the insurance pool, and thankfully, we’ve not had to use it, so we can’t really test either its robustness or whether it would provide the same correct level of processes that I think we’re seeing in Japan, so. But I think we need to move into that space relatively quickly after we implement the current revisions to the Paris Conventions. I think that’s going to be the next order of action.”

**Box 4.2**

**Legal expert:** “Especially in talking about trans-boundary issues, whether we’re talking about an event on a particular site that has trans-boundary effects or whether we’ve got material in transport, the actual claims management process, there is the very, very practical element of. . . how you physically deal with it, [. . .], but also how you deal with which countries, what claims, and issues like that. [. . .] Most of the European Member States, but, not all of them, are members of a liability convention, but not all the same convention, and then some of them, say like Ireland, non-nuclear states, are not members. There are also differences between members of the same convention, for example the Vienna Convention, providing different levels of, compensation or other aspects. But even Member States that are party to the Paris Convention, that we are a party to, all have different levels of compensation [. . .] so what really would happen on a trans-boundary situation at the moment is that claims would come flooding in, as we’ve already seen with Fukushima, for example, and then they’ve all got to be sorted out. So, the questions to address would be what is the claim, where has it come from, what convention that individual’s state is party to, , as in where does the compensation come from, and at the moment, looking at these issues. . . this is where the lawyers really do get excited.”

**Box 4.3**

**Legal expert:** “Absolutely, and that’s one of the arguments that’s given. If we use Ireland as an example, and this is what <> has been working so hard to do, is to update the implementation of the Paris Convention in the UK. There’s now a much wider geographical scope in the Paris Convention, as some of you will be aware, that enables more claims outside of the Paris Convention states to be brought – so, at the moment, it’s just almost like the Paris Convention club, and if you’re in the club, that’s okay and you can bring a claim, but if you’re not, i.e. a non-nuclear state, you cannot.

But if we use Ireland as an example, the new geographical scope of the Paris Convention at least now captures some of these non-nuclear states subject to the qualifying criteria, but again, it’s not the whole picture. There’s lots of lawyers now speaking – I suppose it’s becoming, in a way, an old term, about a global liability regime, requiring that everyone is party to the same regime, so that we all have the same rules and we know where we stand, but it’s still very much. . .and they talk about, in fact, the ‘patchwork’ of conventions, so it’s currently this mix-match. But the non-nuclear states are finally being drawn in but I wouldn’t say it covers the whole picture.”

**Box 4.4**

**Risk and insurance expert:** “I don’t think, whether it’s Ireland or any other non-nuclear country, we would get a flood of court cases. I don’t believe that at all, you know, because there’s a cost both financial and emotional involved in putting a court case, and no one does it for fun, I don’t believe. So, I disagree with that.”

**Box 4.5**

**Legal expert:** “So, I take your point, <>, that people ideally don't want to go to court because it is a long process, but there are certain countries in the world that are far more litigious than others, and certain citizens of those countries who will try to bring a claim more frequently than others, and we saw, after Fukushima, certain countries saying, right, I'm going to take myself outside the Fukushima regime, go back to my home country and bring an action in the courts there. That's a big issue for people and particularly for developers, operators and the like.

The other point I was going to make is, particularly when you're looking at developing countries who are just stepping into the nuclear world, putting conventions in place, there's sometimes a political game played of how far they will allow the convention to apply when they put that into domestic legislation, and so they may exclude countries nearby that don't themselves have a nuclear reactor because that gives them political power in a particular region, which then brings more complex issues if there ever was to be a claim in that region, particularly when the countries are so close together, and Europe would be a good example of that.”

**Box 4.6**

**Risk and insurance expert:** “And I think that. . . I mean, I'll come back to the first part of the question, to start with, about cross-border. Certainly, [insurers] have cross-border arrangements in place so that, if there was a cross-border incident, [insurers] would get assistance from other countries to settle the claims. It's where claims go to, as you've just said, and as the Act is changed, it becomes more apparent where you have to make that claim I think, and certainly it directs people to a certain place to make the claim, where the claim occurred, forgetting transit for the moment because that's a whole new ballgame and a difficult one. So, all of these refinements of the Convention and how they're interpreted in local Acts is important, and I think that the more standardisation you can have, the better, but we in this country have been very lucky with the. . . cooperation – no, that's not the right word, but the way that the Government have talked to insurers and found exactly how they are prepared to cover as much as they can, but they need to have certainty as to what they're covering. Whereas, the Convention still leaves things loose, because a Convention does do that, you know – it's an international thing and it has to apply to lots of places. If you can get it a little bit more tied down, then insurers are happier putting their capital in place, and I think that's how we're doing it here, and, going forward, will perhaps influence other countries. But, yes, if we could get the same Act in all European countries, that would be great, but I think, you know, law-makers just don't do that. [. . .] Everybody knows where cover starts and finishes and therefore they know, if you want to make this claim, you make it against the site licence holder, obviously, because they're the person responsible, but there is cover for that. If it's outside of those parameters, then it's up to the Government to decide what they want to do about those people.”

**Box 4.7**

**Regulatory expert:** “How soon should you provide money compensation? I think it's really crucial to do it as earlier as you can, I mean, because it's about rebuilding trust through that because, when people have got hardship, they want some help in doing that, so it's important from that. . . trying to rebuild the trust in society, that people are seeing that there's a just response to it, there's an early response, and that that happens as quickly as possible. And I know, in some of the emergency exercises, when the question has come up of the licensee, the licensee says, well, we'll give an ex-gratia payment out, and part of this is a human response to people in distress, but part of it is also about rebuilding trust there.”

**Box 4.8**

**Risk and insurance expert 1:** “And I think that's another area where the revised Convention is going to make things easier, because there are more heads of damage coming in, there's more preventative measures and evacuation costs and things like that will come into the Act, and so therefore there isn't uncertainty about it.”

**Risk and insurance expert 2:** “If we're allowed to be in the emergency room, the timeliness is much better. We know where we've got to put our resources. You know, if it's only for putting a caravan in a social centre somewhere or a desk in a social centre somewhere that everybody's been evacuated to, we know that, if we can put somebody in that corner, lots of people come and talk to you.”

**Box 4.9**

**Regulatory expert 1:** “Where things sit in relation to the boundary [. . .] as to where a liability regime stops, but the ripple effects of any accident go on and on. There are some fairly obvious ones perhaps from the tighter evacuation zone, where people have to be re-housed, they've lost their land, their businesses, etc.”

**Regulatory expert 2:** “Just to close off this thing about where the bounds are, because one of the things that it brought up in my mind is. . . is the bound. . . does it include, and perhaps there's a legal view on this – I'm sure there will be – does it include where people have got psychological harm through their own unreasonable views, so that you may say a reasonable person would not have held those views? You know, you. . . okay, we do observe you having psychological harm, but actually, it's not reasonable that you should have done because your fear, your misconceptions were such that it would be unreasonable for you to be harmed in that way. Because some people would be more vulnerable than others, and so, would that be within the bounds of the heads of. . .?”

**Box 4.10**

**Legal expert:** “Whether those people have got traction or not? It depends what they’re trying to claim for, and that could determine, whether we’re talking about Nuclear Liability or not. Of course, with nuclear liability, we do have the Nuclear Installations Act to start with, which is always the starting point. So, it would be looking at the type of loss that person has – and determining whether that is a head of damage under the legislation? [...] I suppose just talk generally here, the law of tort, so we could be looking at where there’d been a duty of care that’s been breached, negligence acts, economic loss – each has its own problems in English law. But that’s where you would go. That’s what I call a normal civil claim. So, if one had suffered a loss from any incident, whether it was nuclear or not, and there had been a breach of law, then that individual could go, with the advice of its lawyers, to the courts. The court would apply that standard, let’s say, civil law, whatever principles would apply, regardless of whether it was a nuclear incident or not. [...] A loss is either covered by the Nuclear Installations Act or it’s not. If it’s not covered, you would then, as an individual, look to see where else you could go for support, whether that was the Government, other compensation put aside, or the courts themselves.”

**Part 5—comments on BP Macondo incident 2010****Box 5.1**

**Legal expert1:** “The joy about the conventions and how they’re brought into law is you channel it to the operator. You have a clear party that you are seeking liability from. Once you go outside that, you start getting into the question of “Whose fault is this and where do you go?”

**Legal expert2:** “And whether they can pay. . .”

**Legal expert3:** “And whether they can pay! With the Horizon compensation, BP decided to compensate these people because of the reputational risk to them and the effect it would have had on their business going forward if they’d chosen not to do so, and they said we recognise it’s our fault, we recognise it was an issue with our plant, and we will compensate. But there is this problem of how far the insurance markets will help you, how big a pot of money we have. Without going into particular companies, but the big oil majors have huge amounts of money and they are able to compensate – not unlimited, obviously, but they do have a large pot of cash behind them. Nuclear operators may not have that pot of cash, depending on which company you’re looking at. They may not be able to get insurance to cover the wider liabilities, and simply, it may put them out of business, which then gives you a different issue of who’s going to decommission the plant because, if they’re out of business and they’re not around, you’ve then got a bigger issue to deal with, which is a plant that’s in trouble and who’s going to deal with that. So, the reason I believe that the compensation regime was set up in the way it is, is to make it clear to operators what their liability is, what they can get covered for, what may be outside the cover, and then they can make a decision whether they actually want to be in this business or not.”

**Box 5.2**

**Risk and insurance expert:** “The regime and the liability law is designed to also deal with the everyday incident that might happen, and the law here is very clear, and will be clearer when we implement the revised legislation, about what can and cannot be compensated. There will always be people who will want to have a go and try and, you know, put a speculative claim in, but, you know, the courts, certainly in the UK, are sensible, and I don’t think they’re going to just ignore what is established in legislation and in law, and just start awarding money left, right and centre. If there’s a catastrophic accident, in a sense, the whole game changes – you know, there are political issues at stake, reputational issues at stake, and in a sense, all bets are off at that point and given the experience of Fukushima who can predict what will and won’t be compensated. But for the purposes of the everyday, I think the law is absolutely clear on what is and what isn’t compensable.

There’s the human interest story, which is going in the other direction, and the natural tendency to... for the outsider, not for the people involved, but for the outsider, to wallow in the excitement and the misery that is generated by a disaster... I mean, cynically, that’s probably one reason why we have correspondents that go to disaster zones. It’s not so much to help the disaster victims, it’s because we want to read about other people’s woes... it’s a sort of Schadenfreude, isn’t it, which is a terrible thing.”

**Part 6—comments on trust, fear and responsibility****Box 6.1**

**Risk and insurance expert:** “[Insurers] are happy to cover things where [they] know what the boundaries are, and [they] are more into the situation with revised Convention, revised Paris and revised Nuclear Installations Act, in particular – not the Convention because it doesn’t tie things down, but [insurers], in this country now, have more idea as to where things start and finish, or at least I hope we’re going to have that at the end of the changes. And, as far as I’m concerned anyway, and this is personal [...], because we won’t know until things are tested, and it always is left to the courts in the final decision anyway, but if you were talking about somebody who has bodily injury and therefore suffers some sort of psychological trauma because of that, then, yeah, I’m sure [insurers would] be paying compensation for both of those parts of the claim. But if their aunt who lives in Glasgow, and they’re down in Kent, where the event occurred, has psychological trauma, [insurers] wouldn’t be looking to pay that, because it’s not direct, and it’s therefore indirect, and that’s where the difference comes, and, you know, I can’t say much more than that.”



**Box 6.2**

**Risk and insurance expert:** “Well, I think we recognise that, you know, there could and there should be more done at the front-end of all of this to explain, you know, the impact of radiation and what radiation is and all the rest of it., and it's not like we haven't tried it and we haven't done it, but I think it is a very difficult message to... for people first to understand and then remember. So, every time you get a story, whether it's Fukushima or, you know, traces of polonium found in a restaurant it always feels incredibly scary. People also confuse civil nuclear with military nuclear, so it's a real tough challenge, but we do recognise that we need to do more to explain nuclear.”

**Box 6.3**

**Legal expert:** “I was just going to say, where we do focus on this liability, it's just going back to what <> was saying, we see an awful lot of this as really being emergency preparedness basically, but also, if we look back in the past, if we think, I don't know, back to the '80s, let's say, before the nuclear renaissance, the nuclear industry was very, very secretive or there was a huge distance between the public and the nuclear industry, ...there have been huge steps since.”

**Box 6.4**

**Regulatory expert 1:** “There's a bit of sort of systems thinking around this that perhaps we need to think about. I mean, the first point is, yeah, you made the point just now that people fear radioactivity, radiation, and that's obvious and important and I don't know how we deal with it. I know people are looking at this again at the moment. But that then has an implication because, when policymakers start thinking about intervention levels and so on, the scientific sort of analysis sometimes suggests that it should be quite a lot higher, but lots of conservatism are put into the analysis, for very understandable reasons. [...] You're affecting a very large number of people. And so, you're actually building on the fear - by including the fear, you're developing an even greater level of fear. Some of that is being done to generate trust. That actually can have an obverse effect, an inverse effect, because, you know, if then people feel later that, you know, they're not getting the whole truth or that, in many cases, you know, they've got doses or something which are higher than those levels, which are artificially low, then that's again going to affect trust, and that happened a lot I think post-Chernobyl.”

**Regulatory expert 2:** “I completely agree with what's been said about sort of prior understanding about radiation exposures and so on and the risks from it etc. but I do think you have to remember that the communication after the event, with the newspapers, is actually going to trigger a lot of your claims, and so we need a mechanism to actually put appropriate and I think... I can't think what the word is, but reliable, trustworthy... people who are speaking for the Government, for the industry, and so on, to make that trust come across to the newspapers and so on.”

**Box 6.5**

**Regulatory expert 1:** “Yeah, but that makes it worse because you get... you get all your social media going out and so on. So, we need to respond in an appropriate manner to the incident that's occurred and communicate. It always, to me, it always comes back to communication. If you want to stop these additional claims from the other side of the country and so on, explain how they're not going to be exposed, but not necessarily using ICRP speak!”

(Note: ICRP refers to the International Commission on Radiological Protection)

**Regulatory expert 2:** “The first thing is that, if people choose to live around the nuclear plant, and that's probably predominantly the population we're talking about here – there will be others, but the bulk of them – then it should be clear to them that the risks, etc. they're being exposed to and the type of events that can occur, from any type of releases up to a full-scale emergency, obviously. So, there should be some expectations set around that. But, on the other side, there should also be expectations set about what they could expect if there is an emergency, in terms of meeting their needs, the sort of things we've touched on, but I don't think we've delved very far. What's the list of things... what will those things look like, in reality, you know? You know, you might have to move home or whatever. And how can they expect those things are going to be addressed in a timely manner, to come back to your point on timeliness as well, because that's going to be crucial, and it picks up <>'s point earlier, it addresses this loss of trust because, if you set the expectations right at the start and something does happen, yes, of course there's trust lost, but is the trust lost less because there was that expectation that, well, these things can happen, but then you have to trigger in the needs will be addressed at that time and meet those needs that you said will be addressed.”

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